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**DETERGENT COMPOSITION FOR MODIFIED OIL STAINS**

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DETERGENT COMPOSITION FOR MODIFIED OIL STAINS

[Hensei yushi yogore senjozai zoseibutsu]

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[There are no amendments to this patent.]

Abstract

## Object

To provide a detergent composition for modified oil stains that has superior cleaning power with respect to tough stains such as oil stains, as well as excellent low-temperature storage stability and foaming power.

## Constitution

The detergent composition for modified oil stains of the present invention is characterized by comprising components (a)-(d) below:

(a) 0.1-30 wt% of a mixture of at least two compounds represented by general formula (1) of [Structure 1] below;

(b) 0.1-20 wt% of one or more amphoteric surfactants or nonionic surfactants; (c) 0.01-20 wt% of one or more amine compounds and (d) 0.0001-20 wt% of one or more compounds selected from a group consisting of glycolic acid, acetic acid, lactic acid, phenol, phosphoric acid, and the like.

[Structure 1]



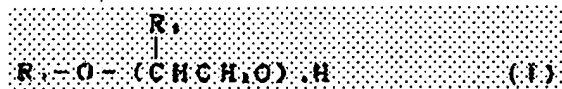
(in the formula,  $R_1$  denotes a phenyl group,  $R_2$  denotes a methyl group, and  $n$  denotes the oxyalkylene addition mole number and is an integer of 1-5).

Claims

1. A detergent composition for modified oil stains, characterized by comprising components (a)-(d) below:

(a) 0.1-30 wt% of a mixture of at least two compounds represented by general formula (1) of [Structure 1] below;

[Structure 1]



(in the formula,  $R_1$  denotes a phenyl group or benzyl group,  $R_2$  denotes a hydrogen or a methyl group, and  $n$  denotes the oxyalkylene addition mole number, and is an integer of 1-5).

(b) 0.1-20 wt% of one or more amphoteric surfactants or nonionic surfactants;

(c) 0.01-20 wt% of one or more amine compounds; and

(d) 0.0001-20 wt% of one or more compounds selected from a group consisting of glycolic acid, acetic acid, lactic acid, citric acid, malic acid, oxalic acid, malonic acid, succinic acid, phenol, phosphoric acid, pyrophosphoric acid, carbonic acid, sulfuric acid, nitric acid and hydrochloric acid.

2. The detergent composition for modified oil stains according to Claim 1, wherein said component (d) is one or more compounds selected from a group consisting of glycolic acid, acetic acid, lactic acid, phenol and phosphoric acid.

#### Detailed explanation of the invention

[0001]

##### Industrial application field

The present invention relates to a detergent composition for modified oil stains, and specifically relates to a detergent composition for modified oil stains that has excellent foaming properties and low-temperature storage stability, and effectively and readily removes tough stains adhered to kitchen tile, porcelain and other hard surfaces, such as oil stains produced when oil is splattered in the kitchen during cooking, and is modified by heat or the passage of time.

[0002]

##### Prior art and problems to be solved by the invention

In typical households, oil stains that are difficult to remove, specifically modified oil stains, are generally produced on kitchen fan blades and gas ranges. These stains are produced as a result of splattered oil when cooking foods such as tempura and fried foods, or when oil is given off during oil fires and adheres to fan blades or gas ranges to generate stains. Oils used as food oils generally have numerous unsaturated chemical structures comprising double bonds, and these types of oils are readily oxidized under the action of heat or light, as well as through exposure to air over long periods of time, resulting in polymerization. A resinous state is thus produced in which the oil has been modified to a material with a high molecular weight. This is the main process whereby modified oil stains are produced, and stains that are difficult to remove are thus generated.

[0003]

In addition, after oil begins to build up on fan blades that are commonly used in homes without being cleaned off, the amount of adhered oil increases to the point where it becomes unsightly in a period of about 6 months. Oil modification is fairly extensive at this point, and a stain is produced that is strongly affixed to the base material and is difficult to remove. In order to remove these types of stains, special detergents or the like are used in which are blended alkylene glycol ether-based solvents such as butyl Carbitol. However, these solvents have problems from the standpoint of safety, odor, solvation and cleaning effects.

[0004]

In addition, in terms of detergent compositions used in order to resolve the above problems, a safe detergent composition with substantially no odor is described in Japanese Patent Application No. Sho 51[1974]-10808 wherein cleaning power is increased by the conjunctive use of hexylene glycol in an alkylene glycol ether-based solvent. However, this detergent composition is insufficient in regard to tough stains such as modified oil stains, and such compositions have not yet provided sufficient results in regard to low-temperature stability.

[0005]

Consequently, the objective of the present invention is to provide a detergent composition for modified oil stains which has superior foaming power and low-temperature storage stability, while also having excellent cleaning power with respect to tough stains such as oil stains that have been modified under the influence of temperature, moisture, light, oxygen and microorganisms.

[0006]

Means to solve the problems

The inventors of the present invention, as a result of various investigations, discovered that the above objectives can be attained by using a detergent composition that comprises a nonionic surfactant or anionic surfactant, an amine compound and a special acid contained in a mixture of two or more special alkylene glycol ether-based solvents.

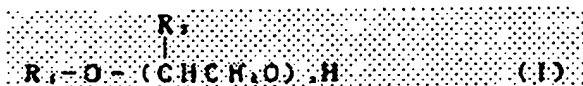
[0007]

The present invention was developed based on the above knowledge, and provides a detergent composition for modified oil stains characterized by comprising the components (a)-(d) below.

(a) 0.1-30 wt% of a mixture of 2 or more compounds expressed by general formula (I) of structure (2) below.

[0008]

[Structure 2]



(in the formula,  $R_1$  denotes a phenyl group or benzyl group,  $R_2$  denotes a hydrogen or a methyl group, and  $n$  denotes the oxyalkylene addition mole number, and is an integer of 1-5).

[0009]

(b) 0.1-20 wt% of one or more types of nonionic surfactants or amphoteric surfactants; (c) 0.01-20 wt% of one or more types of amine compounds, and (d) 0.0001-20 wt% of one or more compounds selected from a group consisting of glycolic acid, acetic acid, lactic acid, citric acid, malic acid, oxalic acid, malonic acid, succinic acid, phenol, phosphoric acid, pyrophosphoric acid, carbonic acid, sulfuric acid, nitric acid and hydrochloric acid.

[0010]

The detergent composition for modified oil stains of the present invention is described in detail below.

[0011]

The above component (a) used in the present invention has no particular restrictions, provided it is a polyoxyalkylene monobenzyl ether or polyoxyalkylene phenyl ether (solvent) represented by general formula (1) of [Structure 2] above (same as [Structure 1] above). However, polyoxyethylene derivatives wherein  $R_2$  is a hydrogen and the value of  $n$  is 2-5 in general formula (I) above are preferred, and mixtures of two types of solvent wherein  $n$  is at least 2 (mixed solvent) are preferred because they provide superior cleaning power with respect to tough stains such as oil stains.

[0012]

Examples of the above component (a) comprising a mixture of two or more compounds described above include mixtures of polyoxyethylene ( $p = 2$ ) phenyl ether and polyoxyethylene ( $p = 3$ ) phenyl ether or mixtures of the above mixture with polyoxyethylene ( $p = 4$ ) phenyl ether and/or polyoxyethylene ( $p = 5$ ) phenyl ether; mixtures of polyoxypropylene ( $p = 2$ ) phenyl ether and polyoxypropylene ( $p = 3$ ) phenyl ether or mixtures of these mixtures with polyoxypropylene ( $p = 4$ ) phenyl ether and/or polyoxypropylene ( $p = 5$ ) phenyl ether; mixtures of polyoxyethylene ( $p = 2$ ) benzyl ether and polyoxyethylene ( $p = 3$ ) benzyl ether or mixtures of these mixtures with polyoxyethylene ( $p = 4$ ) benzyl ether and/or polyoxyethylene ( $p = 5$ ) benzyl ether; and mixtures of

polyoxypropylene (p = 2) benzyl ether and polyoxypropylene (p = 3) benzyl ether or mixtures of these mixtures with polyoxypropylene (p = 4) benzyl ether and/or polyoxypropylene (p = 5) benzyl ether.

[0013]

The blend amount of the above component (a) is 0.1-30 wt% in the composition of the present invention (wt% values related to blend amounts are denoted below simply by "%") is preferably 1-20%, and more preferably 3-15%. If the above blend amount is less than 0.1%, sufficient cleaning power is not obtained, whereas the effect will be saturated in excess of 30%, which is not economical.

[0014]

The above component (b) used in the present invention has no particular restrictions, provided that it is a nonionic surfactant or amphoteric surfactant, but the following are exemplified as preferred compounds.

[0015]

Examples of the above nonionic surfactant include polyoxyethylene alkyl or alkenyl ethers, polyoxyethylene alkyl phenyl ethers, polyoxypropylene alkyl or alkenyl ethers, polyoxybutylene alkyl or alkenyl ethers, mixed nonionic surfactants having alkenyl groups or alkyl groups with added alkylene oxides, sugar fatty acid esters, fatty acid glycerol monoesters, higher fatty acid alkanolamides, amine oxides, ethylene oxide condensed surfactants, and the alkylene glycosides represented by general formula (II) of Structure (3) below. Among these compounds, polyoxyethylene alkyl or alkenyl ethers, higher fatty acid alkanolamides and alkyl glycosides are preferred, and specific examples that may be cited include polyoxyethylene (p = 12) lauryl ether, dodecylmaltoside and coconut fatty acid diethanolamide. These nonionic surfactants may be used individually or in mixtures of two or more types.

[0016]

[Structure 3]



(In the formula, R<sub>1</sub> denotes a linear or branched alkyl group, alkenyl group or alkyl phenyl group with a carbon number of 8-18, R<sub>2</sub> denotes an alkylene group with a carbon number of 2-4, and G denotes a residue derived from a reduced sugar with a carbon number of 5-7 such as glucose, where x denoting the alkyl glycoside number (average value) is 0-5, and y (average value) is 1-10.)

[0017]

Examples of the above amphoteric surfactants that may be cited include alkylcarbobetaines, alkylsulfobetaines, alkylhydroxysulfobetaines, alkylamidocarbobetaines, alkylamidosulfobetaines, alkylamidohydroxysulfobetaines, alkylamidoamine-type betaines and alkyl imidazoline-type betaines. Specific examples that may be cited include alkylamidopropyl-N,N-dimethyl acetic acid betaine, alkylamidopropyl-N,N-dimethyl-2-hydroxypropylsulfobetaine, alkylamidopropyl-N,N-dimethylpropylsulfobetaine, dodecyl-N,N-dimethylacetic acid betaine, dodecyl-N,N-dimethylpropylsulfobetaine, dodecyl-N,N-dimethyl-2-hydroxypropylsulfobetaine, myristyl-N,N-dimethyl-2-hydroxypropylsulfobetaine, palmityl-N,N-dimethyl-2-hydroxypropylsulfobetaine, dodecanoic acid amidoethyl-N-hydroxyethylpropionic acid, tetradecanoic acid amidoethyl-N-hydroxyethylpropionic acid, coconut amidoethyl-N-hydroxyethylpropionic acid and alkali metal salts, ammonium salts or alkanolamine salts thereof, 2-coconut oil alkyl-N-carboxymethyl-N-hydroxyethylimidazolinium betaine, 2-dodecyl-N-carboxymethyl-N-hydroxyethylimidazolinium betaine, coconut oil alkyl-N-carboxyethyl-N-hydroxyethylimidazolinium betaine, and the like. Among these compounds, alkylamidocarbobetaines and alkylamidosulfobetaines and the like are particularly desirable from the standpoint of cleaning power and foaming power, and specific examples that may be cited include lauric acid amidopropyl-N,N-dimethylacetic acid betaine, myristic acid amidopropyl-N,N-dimethylacetic acid betaine and cocamidopropyl-N,N-dimethylacetic acid betaine. These amphoteric surfactants may be used individually or in mixtures of two or more types.

[0018]

The blending amount of the above component (b) is 0.1-20% in the composition of the present invention, with 0.1-15% being preferred and 1-10% being additionally desirable. If the above blending amount is less than 0.1%, sufficient cleaning power will not be obtained, whereas effects will be saturated if the amount exceeds 20%, which is not economical.

[0019]

Examples of amine compounds of the above component (c) used in the present invention include mono-, di- or trialkanolamines and other alkanolamines or ammonia. Among these compounds, monoethanolamine and diethanolamine are preferred from the standpoint of cleaning power. These amine compounds can be used individually or in mixtures of two or more types.



[0020]

The blend amount of the above component (c) is 0.01-20%, with 0.05-10% being preferred. If the above blend amount is less than 0.01%, then the cleaning effects will be insufficient, whereas the effects will become saturated if the amount exceeds 20%, which is not economical.

[0021]

The component (d) used in the present invention is one or more selected from a group consisting of glycolic acid, acetic acid, lactic acid, citric acid, malic acid, oxalic acid, malonic acid, succinic acid, phenol, phosphoric acid, pyrophosphoric acid, carbonic acid, sulfuric acid, nitric acid and hydrochloric acid. Among these compounds, glycolic acid, acetic acid, lactic acid, phenol and phosphoric acid are preferred, with phenol being particularly desirable. These acids may be used individually or in mixtures of two or more types.

[0022]

The blend amount of the above component (d) is 0.0001-20% in the composition of the present invention, with 0.001-15% being preferred and 0.01-10% being additionally desirable. If the above blend amount is less than 0.0001%, there will be insufficient effects from the standpoint of low-temperature storage stability, whereas blending will be difficult if the amount exceeds 10%.

[0023]

The following optional components may be blended as necessary in the detergent composition for modified oil stains of the present invention. Examples of low-temperature stabilizers that may be blended include ethyl alcohol and other lower alkyls; ethylene glycol and other lower glycols; and benzene sulfonate, toluene sulfonate and other lower alkylbenzene sulfonates. In addition, examples of viscosity adjusters that may be blended include montmorillonite, hectorite, vermiculite, attapulgite, sepiolite and smectite-type clay minerals having mixtures thereof as primary components, which are known as swellable clay minerals; as well as sodium polyacrylate, crosslinked polyacrylic acid, polyacrylic acid alkyl ester and other acrylic-based homopolymers or copolymers; and polyvinyl alcohol, hydroxyethylcellulose, carboxymethylcellulose, polyvinylpyrrolidone, maleic anhydride polymer, and the like. In addition, fragrances, dyes, preservatives, antioxidants, thickeners and the like may be blended in order to enhance the value-addedness of the product.

[0024]

The detergent composition for modified oil stains of the present invention can be prepared as an aqueous solution using common methods to blend the above optional components, used as necessary, along with the above essential components (a)-(d).

[0025]

**Application examples**

The detergent composition for modified oil stains of the present invention is described in additional detail below by providing application examples and comparative examples, but the present invention is not restricted to these application examples.

[0026]

Detergent compositions having the various compositions shown in Table 1 below (Application Examples 1-6 and Comparative Examples 1-3) were prepared, and these detergent compositions were subjected to the cleaning power test, foaming power test and low-temperature stability test described below. The results are presented in Table 1.

[0027]

**Cleaning power test**

Tempura oil was applied uniformly to a steel plate, which was then baked for 20 min at 180°C, thereby forming a fairly dry film and producing a model stained plate. These plates were used in order to carry out the cleaning power test. Specifically, a detergent composition was dripped onto a model stained plate that was fixed vertically, and after leaving for 40 sec, the lifted stain was wiped away with defatted cotton, and the degree of cleaning (cleaning power) was visually evaluated. The evaluation standards are presented below.

⓪ Complete stain lifting

O: Approximately 80% stain lifting

O-Δ: Approximately 60% stain lifting

Δ: Approximately 50% stain lifting

Δ-X: Approximately 30% stain lifting

X: No stain lifting

[0028]

**Foaming power test**

The detergent composition was sprayed onto window glass with a commercially available sprayer, and the foaming power at this time was functionally evaluated. The evaluation standards are presented below.

⊙: Extremely favorable spraying

O: Good foaming when sprayed

Δ: Slight foaming when sprayed

X: No foaming when sprayed

[0029]

**Low-temperature stability testing**

Each detergent composition was stored for 20 days at -5°C, and a determination was made regarding whether sedimentation occurred or not. The evaluation standards are presented below.

O: No sedimentation

X: Sedimentation

[0030]

Table I

		①						②		
		実 施 例						比 較 例		
		1	2	3	4	5	6	1	2	3
③	成 分 (a)	④	1.0	2		5		3		1.0
	⑤		2	1.0	2	5	6	5		5
	⑥			1.0		4	2			
⑦	成 分 (b)	⑧	1.5			5		5		
	⑨		3				5		3	
	⑩			5						
⑫	成 分 (c)	⑪	1.5		5					
	⑬	5	5	3	1			3	3	
	⑭					5	5			5
⑮	成 分	⑯	0.05		0.05					
	⑰					0.05	0.05			
	⑱		0.05	0.05						
⑲	⑳							1.0		
㉑	㉒								2	
㉓	㉔									3
㉕	㉖									
㉗	㉘	㉙	○	○	○	○	○	△	○	△
	㉚	㉛	○	○	○	○	○	△	○	○
	㉜	㉝	○	○	○	○	○	×	×	×

- Key: 1 Application Example  
 2 Comparative Example  
 3 Component (a)  
 4 Polyoxyethylene (p = 2) phenyl ether  
 5 Polyoxyethylene (p = 3) phenyl ether  
 6 Polyoxyethylene (p = 5) phenyl ether  
 7 Component (b)  
 8 Polyoxyethylene (p = 12) lauryl ether  
 9 Dodecyl maltoside  
 10 Coconut fatty acid diethanolamide  
 11 Myristic acid amidopropyl-N,N-dimethylacetic acid betaine  
 12 Component (c)  
 13 Monoethanolamine

14	Diethanolamine
15	Component (d)
16	Glycolic acid
17	Phenol
18	Phosphoric acid
19	Diethylene glycol monobutyl ether
20	Sodium lauryl sulfate
21	Sodium stearylbenzene sulfonate
22	Water
23	Evaluation
24	Cleaning power
25	Foaming power
26	Low-temperature storage stability
27	Balance

[0031]

From the above results, it was determined that the detergent composition for modified oil stains of the present invention has superior cleaning power with respect to modified oil stains, as well as excellent foaming power and low-temperature stability. In addition, the detergent composition for modified oil stains of the present invention causes minimal damage to the base material that is to be cleaned, and also causes little roughening of the hands.

[0032]

Similar effects as in Application Examples 1-6 were obtained when component (d) in the above application example was changed to acetic acid, lactic acid, citric acid, malic acid, oxalic acid, malonic acid, succinic acid or pyrophosphoric acid, which are the other components (d) that may be used in the present invention.

[0033]

Effect of the invention

The detergent composition for modified oil stains of the present invention has excellent foaming power and low-temperature storage stability, as well as excellent cleaning power with respect to tough stains such as oil stains that have been modified under the influence of factors such as temperature, humidity, light, oxygen and microorganisms.